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# Collecting with Sennett in Texas

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GEORGE B. SENNETT
From the Ruthven Deane Collection,
Library of Congress

George B. Sennett was a businessman, manufacturer, inventor, public servant, and patron of the arts. His contemporaries, however, recognized him not for these achievements, but for his preeminence as an authority on Texas bird life and his leadership in the conservation movement of the 1880's and 1890's. Sennett labored for several years to prepare a monograph on the bird life of Texas, a volume eagerly awaited by his colleagues, but unfortunately left incomplete by his untimely death on 18 March 1900. His contributions to Texas ornithology, however, stand forth clearly in his bibliography of 17 papers comprising a total of over 175 pages and the thousands of skins, eggs, and nests of Texas and Mexican birds collected by Sennett and his agents.[1]

Sennett's diaries of his three trips to Texas, the field books of his collectors, John Priour and William Lloyd, and his correspondence are preserved in the Barker Texas History Center (BTHC). Additional correspondence is found in the Archives of the American Museum of Natural History (AMNH), the Archives of the Smithsonian Institution (ASI), and the personal papers of G. H. Ragsdale. It is from these sources and the published memoria of Sennett and his collectors that the following account has been compiled.[2] The names of the birds observed or collected by Sennett have been changed to conform with the names in *The Bird Life of Texas.*

George Sennett was born on 28 July 1840 in Sinclairville, New York, the only child of Pardon Sennett and Mary Burritt. The family moved quite early to Erie, Pennsylvania, where Pardon Sennett was engaged in the iron smelting industry. George was educated at Erie Academy and later spent four years at a preparatory school in Delaware County, New York. It was his intention to enter Yale University, but medical problems with his eyes caused him to forego his formal education and to spend the next four years traveling in Europe where he studied literature and languages.

In 1865 Sennett returned to the United States and assumed the management of his father's iron works in Meadville, Pennsylvania. The factory manufactured oil well machinery, and Sennett's aptitude for mechanics became quickly apparent in his development of a new type of engine and a patent for a steel skate.[3] Once

established in business, Sennett married Sarah Essex, a union to which a daughter, Georgia, was born in 1868.

Pardon Sennett died around 1870 leaving George the heir to the extensive family interests. During 1879 Sennett aided in the formation of the Meadville Library, Art and Historical Association and in 1880 organized and served as president of the Meadville Natural History Society. During 1881 he was mayor of Meadville and in 1882 aided in the formation of the Meadville Glass Company and served as its first president. Sennett maintained his headquarters at Meadville until 1896 when he moved his factory to Youngstown, Ohio.

There is no indication in Sennett's early life of an interest in birds or the study of natural history. By his own account, his interest in birds was first kindled in 1874 while reading Elliott Coues' *Field Ornithology.* A correspondence with Coues led to a friendship in which Coues would later serve as the editor and annotator of Sennett's papers on the birds of the Lower Rio Grande.

Sennett collected his first specimens during 1874 in the region of Erie, Pennsylvania. In 1876, in company with E. J. N. Sanford, he visited Grant County, Minnesota, where he secured a large series of specimens. With the acquisition of this field experience, he confidently set out to enlarge the scope and thrust of his newly found avocation.

It is uncertain why Sennett chose the Rio Grande Valley of Texas as the focus of his work. We are told only that ". . . avenues of investigation opened in all directions; but the weight of influence drew me to the Rio Grande."[4] In 1876 the avifauna of the Rio Grande Valley was to a great extent unknown. The small collections made prior to 1851 by Jean Louis Berlandier and during the 1850's by D. N. Couch, J. H. Clark, Arthur Schott, and Stewart Van Vliet are included in the report of the United States-Mexico Boundary Survey.[5] In 1865 and 1866, Henry Eeles Dresser published the results of his collections in the Brownsville-Matamoros area, but the specimens upon which this work was based were not readily available to american ornithologists.[6]

James Cushing Merrill, M. D., began to make significant collections of birds soon after his arrival at Ft. Brown in February 1876. It is probable that Elliott Coues was instrumental in directing Sennett's attention to Merrill's work and the opportunities for collecting on the Lower Rio Grande. Sennett and Merrill met at Brownsville on several occasions during 1877 and 1878. Merrill provided aid to Sennett in his collecting efforts, and Sennett later described a new subspecies of Pauraque, *Nyctidromus albicollis merrilli,* in honor of his friend.[7]

On 23 February 1877 Sennett left for his first trip to Texas being joined enroute by his assistant, Frederic Smith Webster.[8] The two men arrived in Galveston on the 28th where they collected before traveling on to Corpus Christi where they remained for several days. The now rare Eskimo Curlew was found to be common around Corpus and several were collected. On 23 March 1877 the two men arrived at Brownsville where several days were spent in preparation before moving upriver to Hidalgo which was to be their base of operations. Lodging at Hidalgo was obtained in a mexican jacale which was, however, soon abandoned after being found to be infested with rats. Through the courtesy of the local sheriff they were then allowed to use a room in the courthouse.

Sennett and Webster quickly set a routine of rising at daylight for an early morning hunt with the afternoon being spent in specimen preparation followed

by perhaps another short hunt before dark. Sennett was to some extent unprepared for the rigors of collecting in the brush country and, although he deplored the hardships, he seemed to delight in their description. The torment of fleas, rats, chiggers, ticks, tarantulas, rattlesnakes, cacti, peccaries, impenetrable brush, poor food, and unbearable heat are mentioned frequently in his diary. These hardships and the fatigue resulting from a sustained work schedule were perhaps contributing factors to the friction which developed between the two men as the days passed.

Collecting at Hidalgo was concluded during the second week in May and on the 13th Sennett traveled to Brownsville to meet and compare notes with Merrill. On the following day a Mexican hunter brought Sennett some eggs and a young bird which was possibly an Ibis. Intrigued by the specimens and the stories told by the hunter, Sennett hired a wagon to carry them to an immense salt marsh about half-way between Brownsville and the coast. The marsh was filled with rushes except near the shore and very few birds were seen. The Mexican immediately stripped and waded into the shallow lake beckoning the skeptical Sennett to follow. Upon entering the reeds a few nests were found, and when Sennett shot an Ibis he was ". . . completely overwhelmed [and] for a time transfixed" by the sight of thousands of birds "plunging and screaming above the rushes." Species nesting in the marsh included the White-faced Ibis, Great Egret, Snowy Egret, Louisiana Heron, Black-crowned Night Heron, Common Moorhen, and American Coot. Sennett was so impressed that he returned with Merrill on the following day to collect again at the "great heronry."[9] This was the last major hunt during 1877, and the next several days were spent in preparing and packing specimens. On 22 May 1877 Sennett and Webster boarded a boat at Port Isabel for the voyage to New Orleans.

Specimens collected during the 1877 trip included some 500 bird skins, about 1000 eggs, a few mammal skins, a collection of insects, and a number of preserved specimens of birds, mammals, and reptiles. Sennett and Coues worked quickly to prepare the manuscript, and by December 1877 it was transmitted for publication. The published paper consisted of an annotated list of 150 species including the description of Sennett's Olive-backed Warbler, *Parula nigrilora* [now *P. pitiayuma nigrilora*]. New distribution records for the United States included the Northern Ferruginous Owl, *Glaucidium brasilianum cactorum,* White-fronted Dove, *Leptotila verreauxi angelica,* and Weid's Crested Flycatcher, *Myiarchus tyrannulus cooperi.*[10]

Sennett's second trip to Texas began on 9 March 1878 when he left for Chicago to meet his assistant, Elbert Jasper Newton Sanford.[11] The two men arrived in Corpus Christi on 19 March, and on the 23rd hired a small schooner to ferry them along the coast. On the 27th the naturalists visited the two "Bird Islands" on the northern end of Padre Island. On the larger island were hundreds of Reddish Egrets, a number of Great Blue Herons, as well as gulls and terns. The nests of the egrets ". . . were everywhere upon, under, and about the low-growing cactuses, many being upon the ground." Strangely, on the smaller island no nesting egrets were found.[12] On this same day, Sennett collected the first specimen of the White-tailed Hawk to be taken in the United States.[13]

On the night of 29 March the party anchored off the two small shell islands in Corpus Christi Bay known as "Pelican Islands." The scene which greeted them the following morning was one of ". . . about 3 acres literally covered with Brown

Pelicans." An estimated 5,000 pelicans were present and in some places their nests were so close together that it was difficult to walk without stepping on them.[14]

On 3 April the collectors arrived in Port Isabel where three days were spent before moving upriver to a camp along the river near Edinburg. About sundown a flock of over 200 Anhingas was seen to alight in a patch of willows on the river bank. The birds were so tame that they could not be driven from the roost although the naturalists collected several of them at close range. The following day the men traveled on to Lomita Ranch eight miles above Hidalgo where the expedition headquartered courtesy of the owner, J. B. Burbois. Sennett was apparently pleased with the accomodations for he noted that things were much better than ". . . last year at Hidalgo."

During April 1878 Sennett met twice with Samuel Moore Finley, M.D., who was stationed in an army camp near Hidalgo. Finley had been stationed at various locations in the Lower Rio Grande since November 1875 and in the intervening time had collected many birds for Merrill.[15] Sennett later described Finley as ". . . a careful observer of game birds" and credited him for information about the habits of the Red-billed Pigeon, White-fronted Dove, and Blue Quail.

Two new subspecies were collected during the 1878 expedition. On 13 April Sennett collected the first specimen of the Rio Grande Turkey, *Meleagris gallopavo ellioti* [now *M. g. intermedia*], which he named in honor of D. G. Elliot. Also collected during April was the Lomita Wren which would later be described as *Thryothorus ludovicianus lomitensis.*

The collection and preparation of specimens proceeded smoothly, and on 25 May Sennett and Sanford left Lomita Ranch for Brownsville from whence they departed on the 31st for New Orleans. The 1878 expedition resulted in a list of 168 species, 43 of which were not recorded in 1877, thus making a cumulative list of 193 species for the two trips. Over 500 bird skins were prepared, some 1400 eggs, a few mammals, reptiles, fishes, and a collection of insects. Four species new to the United States were collected: (1) Texas Kiskadee Flycatcher, *Pitangus sulphuratus texanus*; (2) Groove-billed Ani, *Crotophaga sulcirostris*; (3) Sennett's White-tailed Hawk, *Tachytriorchis albicaudatus hypospodius*; and (4) the Beardless Flycatcher, *Camptostoma imberbis imberbis.* The Rio Grande Screech Owl, *Scops asio enano,* was also claimed as a new record. These specimens were, however, later determined to be the Texas Screech Owl, *Otus asio mccalli,* which had been collected in the Rio Grande Valley over twenty years earlier by Arthur Schott.[16]

Sennett never again returned to the Rio Grande after 1878. He did, however, continue to receive specimens for a number of years from J. B. Burbois at Lomita Ranch, and from February 1880 through May 1881, Marston Abbott Frazar, collected for Sennett in Hidalgo, Starr, and Cameron Counties.[17] The details of Frazar's collecting trips are unknown, and only three references to specimens collected by Frazar are found in Sennett's papers.

In 1882 Sennett made his third journey to Texas. He arrived in Corpus Christi on 21 April where he met Benjamin Franklin Goss from Pewaukee, Wisconsin.[18] S. M. Johnson, Collector of Customs, provided the two naturalists with a boat for a five day cruise along the coast. Accompanying Sennett, Goss, and Johnson were two assistants, one of which was John Marion Priour who would later become Sennett's collector and a celebrity in his own right.[19]

The party left Corpus on the 25th and proceeded to the Bird Islands and hence to Flour Bluff, Mustang Island, and the mouth of the Guadalupe River. "Pelican Island" was visited and Sennett was surprised to find that it was deserted by the pelicans which had been so numerous during 1877 and 1878. Inquiring as to the cause of this change, Sennett learned that a group of men had hoped to make their fortune selling pelican oil. A rendering factory had been set up on the mainland and thousands of young pelicans collected and boiled for their oil! The oil could not be sold and so the project failed, but not before great damage had been done to the pelican population.[20]

In the following days the naturalists collected in the region of Neuces Bay and the peninsula flats. Goss left Corpus on 14 May whereas Sennett remained until at least 25 May at which time his diary abruptly ends. The results of the 1882 trip were never published.

With the exception of two vacation collecting trips in western North Carolina during 1886, Sennett never again did extensive field work. His interest in Texas birds, however, did not lessen and he continued to correspond with and obtain specimens from Texas naturalists such as J. A. Singley, G. H. Ragsdale. H. P. Attwater, Charles Oldright, and F. B. Armstrong. After 1882 much of his time was directed toward conservation work and taxonomic research at the American Museum of Natural History.

In 1883 Sennett deposited his collection of birds and mammals in the American Museum of Natural History. He also began the custom which was continued until 1896 of spending the winter in New York where he devoted himself to ornithological work in the museum. During 1887–1889 he also served as the president of the Linnaean Society of New York.

In 1883 Sennett became one of the original members of the American Ornithologists' Union, and in that same year was elected chairman of the Committee on the Protection of North American Birds, a position which he held until 1893. From December 1885 until November 1886 Sennett presided over twenty formal and several informal meetings of the committee.[21] Under his direction the committee prepared a bulletin describing the destruction of bird life and a draft of a model law for bird protection. The bulletin was published as a supplement to the 26 February 1886 issue of *Science* and was later reprinted and widely distributed. Sennett's contribution to the bulletin drew heavily from his observations of the ghastly sport of "egging" on the Texas coast. The poachers would first systematically destroy every egg already laid by the birds and then withdraw until the following day to allow the birds to lay fresh eggs. They would then return periodically over the next 2 or 3 days to collect the freshly laid eggs for sale along the coast. Many of the eggs were broken by rough treatment and large quantities were often discarded because of inferior quality or cheap price.

The A.O.U. Bulletin and the Audubon Movement had as their immediate effect the passage of the Model Law in New York during 1886. Although Texas made several faltering steps toward bird protection, it was not until 1903 that the Model Law was finally passed.[22] While not directly involved in lobbying for conservation laws in Texas, Sennett was kept informed of the depredations on Texas bird life through his collectors and correspondents.

John Priour began collecting for Sennett in 1884 and by 1886 he was providing specimens on a regular basis.[23] In the spring of 1887 Priour was employed to

collect in the region between Corpus Christi and the Brazos River. He left Corpus on 7 April traveling through Rockport, Refugio County, Bee County, and Victoria where on 6 May he shipped a box of specimens. Priour then traveled on to the Navidad River, Colorado River, Caney Creek, Brazoria, and arrived on 21 May at the mouth of the Brazos River. He then returned to Brazoria traveling on to Eagle Lake and back to Corpus by 11 June.[24]

William Lloyd began collecting for Sennett in Concho County during January 1887 and from 16 May through 11 October he collected in the Transpecos.[25] Two bushtits collected in the Transpecos were later described by Sennett as *Psaltriparus lloydi* [now *P. melanotis lloydi*]. Notable specimens collected by Priour include those which established new breeding records for several species on the Texas coast and those from which Merrill's Pauraque, Chestnut-fronted Titmouse, and the Texas Tufted Titmouse were described.[26]

The idea of Priour collecting in Mexico was first discussed in December 1886.[27] Priour was eager to go, but the expedition languished through 1887 and it was not until March 1888 that Priour and Charles E. Grover began the trip to Tampico. The two men collected during March, April, and May before returning to Corpus. Priour contracted malaria in Tampico and was ill for several months after his return.

Priour was still suffering from malaria in March 1889, but agreed to return to Mexico and collect in the area around Monterey. Priour and his brother arrived in Monterey on 15 April where they found the collecting good and the climate beneficial for Priour's illness. Collecting continued through May and most of June at which time Priour reported that they had over 600 birds and that he was anxious to get home.[28] The results of Priour's 1888 and 1889 trips into Mexico were never published.

In 1889 Sennett delivered a major address on conservation before the Pennsylvania State Board of Agriculture.[29] Included in the address was a review of and recommendations for protective legislation, a discussion of bounties, and a draft of a proposed law for the protection of birds. In contrast to the fanatical rhetoric of some of his contemporaries, Sennett's arguments are rational, tactfully presented, and demonstrate a keen knowledge of the interrelationships which occur in nature.

During the 1890's Sennett became more involved with his business and his scientific productivity began to decline. He continued, however, to work on his monograph, and several plates were prepared by the artist-naturalist, Ernest Seton-Thompson. Following Sennett's death the manuscript and plates presumably passed to his widow, but their ultimate fate or deposition is unknown.

Sennett described two new species and eight new subspecies of Texas birds. He was also honored by having four subspecies of Texas birds, a species of rodent, and a moth named in his honor.[30] The greatest honor to his memory is not, however, the taxonomic epithets but the multitude of birds which still wing their way over Texas due to the efforts of this great conservationist.

## Acknowledgments

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Historical Society, Thomas Beddoes of the Pennsylvania State Library, Jane Fant of the Ohio Historical Society, and Miss Bess Ragsdale. Norma Bentley reviewed an early draft of the manuscript and I am grateful for her comments. This study was made possible by a developmental leave granted by the University of Mary Hardin–Baylor.

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4. *Bull. U.S. Geol. and Geog. Surv. Terr.,* IV, No. 1, 1878, p. 1.
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6. *Ibis,* 1865, pp. 312–330, 466–495; 1866, pp. 23–46.
7. *Auk* 5:43–46.
8. Geiser, *op. cit.,* p. 237.
9. *Bull. U.S. Geol. and Geog. Surv. Terr., op. cit.,* pp. 56–58. Merrill, *Proc. U.S. Natl. Mus.,* 1878, 1:163, described the heronry as a shallow lagoon of Tule Reeds covering about 75 acres. By 1926 Bent, *U.S. Natl. Mus.,* Bull. 135, p. 53, reported that the marsh had long since been drained and "is now cultivated land."
10. *L. v. angelica* is listed in Ridgway, *Birds N. and Mid Amer.,* 1916, Pt. VII, as Sennett's Dove, *Leptotila fulviventris brachyptera.* What is now considered *M. t. cooperi* was listed by Sennett as *M. crinatus erythrocercus.* This form was also collected by Merrill, *op. cit.,* pp. 137–141, under the names *M. crinatus* and *M. erythrocercus cooperi.*
11. Geiser, *op.cit.,* p. 194.
12. *Bull. U.S. Geol. and Geog. Surv. Terr.,* V, No. 3, 1879, pp. 434–435.
13. The White-tailed Hawk was also collected during 1878 by Merrill, *op. cit.,* pp. 154–157, and the record must be jointly shared. See also Coues and Brewer, *The Country,* 13 July 1878, p. 184.
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23. Letters from Priour to Sennett (BTHC).
24. Priour's field book and letters from Priour to Sennett (BTHC).
25. Letter from Lloyd to Sennett, 9 Jan. 1887 and Lloyd's field book (BTHC).
26. The Texas Tufted Titmouse and Chestnut-fronted Titmouse are considered to be hybrids of *Baeolophus bicolor* and *B. atricristatus* (*The Bird Life of Texas,* Vol. 2, p. 1024).
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30. Animals named for Sennett include the Texas Seaside Sparrow, Sennett's White-tailed Hawk, Sennett's Common Nighthawk, Sennett's Long-billed Thrasher, Sennett's Kangaroo Rat [now *Dipodymys ordi sennetti*], and Sennett's Tiger Moth, *Ecpantheria sennettii* [now *E. muzina*]. The

Tiger Moth occurs in Texas as a straggler from mexican territory (Dyar, 1902, *N. Amer. Lepidoptera*).

# Bird Life of Lyndon B. Johnson State Park

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In 1975 I published the results of my observations of the avifauna of Lyndon B. Johnson State Park (1975 *Bull. Texas Ornithological Soc.*, 8:6–7). The report dealt with sightings during 21 trips over the 5-year period 1971–1975, listing 114 species and providing some tentative classifications as to status and frequency. My observations of the avifauna have continued, with 18 additional trips during the period 1976–1980. This paper reports data accumulated between 1976–1980 and provides a list of additional sightings, and an account of changes in status of species identified thus far.

The Park has continued to undergo development during the last 5 years, though the large addition to the east of the original portion has not been developed as rapidly as one might have thought. Additional development and the flood of August 1978 reduced the density of vegetation along the Pedernales River. Loss of vegetation and increased traffic near the river appear to have reduced the number of wintering ducks, and may help account for a year round decline in sightings of American Crow. Yet the most significant change from the first report has been a substantial increase in the number of species observed—from 114 to a total of 147—an addition of 33 species.

One reason for the increase was perhaps my effort to visit the park during migration, the optimum time for additional sightings. Another reason is that my later visits have tended to be longer than those during the first five years, affording both additional time to observe and increased coverage of the area.

Table 1 gives comparative data for both periods, followed by some comments on birding experiences in the park. The increased average number of sightings for each trip does not imply an increase of species within the park. Rather, it reflects several other factors, one being my learning where to look for a particular species so that it was not missed. Even so, only 12 species were identified on every trip during 1976–80. A second factor is that more trips were made during migration periods, nine of the 18 trips for 1976–80 having occurred during the period March–May, and for these nine, the average number of recorded species was 54. Finally, the time spent during each trip was longer on the average. The record high trip of May 9–11, 1980, which produced 75 sightings, was also the longest, with observations during three days.

My experience has been that migration through the park, involving numerous species that are present only briefly, is light. This conclusion is supported by records which during a ten-year period show only 1 sighting of 1 individual—13 migrant species classified as "rare." They range from a lone Franklin's Gull, Osprey, and Mississippi Kite, to Black-and-white, Blackburnian, Hooded, and Blue-winged warblers. Among 10 species of migrant warblers, only Yellow Warbler, Wilson's Warbler, and Common Yellowthroat appear to occur in numbers.

Table 1. Comparison of fauna lists between periods, 1971–75 and 1976–80.

| Type of data | 1971–75 | 1976–80 |
|---|---|---|
| Trips | 21 | 18 |
| Total species sighted | 114 | 136 |
| Cumulative totals | 114 | 147 |
| Species sighted during one period only | 10 | 33[a] |
| Lowest number for one trip | 6 | 36 |
| Highest number for one trip | 56 | 75 |
| Average number for one trip | 31 | 49 |

[a] Five of the 33 additional species were first reported by William Meriwether and the Travis Audubon Society.

The following species have been sighted since my original article, most of them since the checklist published by the Texas Department of Parks and Wildlife in 1976, which listed 124 species: Double-crested Cormorant, Snowy Egret, Wood Duck, Black Vulture, Mississippi Kite, Sharp-shinned Hawk, Cooper's Hawk, Northern Harrier, Osprey, Upland Sandpiper, Lesser Yellowlegs, Long-billed Dowitcher, Franklin's Gull, Downy Woodpecker, Yellow-bellied Flycatcher, Northern Rough-winged Swallow, Brown Creeper, Winter Wren, House Wren, Blue-gray Gnatcatcher, Yellow-throated Vireo, Black-and-White Warbler, Magnolia Warbler, Blackburnian Warbler, MacGillivray's Warbler, Common Yellowthroat, Hooded Warbler, Wilson's Warbler, Common Grackle, Great-tailed Grackle, Le Conte's Sparrow, Clay-colored Sparrow, Pine Siskin.

The earlier study listed 31 species as probably permanent residents. Black Vulture and Wood Duck have been added from the new list of sightings. Four from the original list—Blue Jay, Eastern Bluebird, House Finch, and Lesser Goldfinch—can now be added to the list of probable permanent residents, making a total of 37 permanent species. It is worth noting that among these additions, Eastern Bluebird nested successfully in the Park in 1978.

Of the total 33 new species, 2 are classified as residents, 2 as summer residents, 9 as winter residents, and 20 as migrants or accidentals. With allowance for the changes to permanent status on the old list, these data produce new totals of 50 winter residents, 25 summer residents, and 35 migrants or accidentals. Among the 114 species listed earlier (1975 *op. cit.*), 1 species, Blue-winged Teal, was changed from winter resident to migrant, and another, Eastern Kingbird, from migrant to summer resident.

Table 2 provides comparative totals on status of residency for the two periods. It may be seen that the largest increase, not surprisingly, is in migrants or accidentals.

Table 2. Changes in residency status.

| Classification | 1975 | 1980 |
|---|---|---|
| Permanent resident | 31 | 37 |
| Winter resident | 45 | 50 |
| Summer resident | 22 | 25 |
| Migrant or Accidental | 16 | 35 |
| Total | 114 | 147 |

Table 3. A summary of frequency changes.

| Frequency | 1975 | 1980 |
|---|---|---|
| Abundant | 16 | 15 |
| Common | 40 | 35 |
| Uncommon | 48 | 76 |
| Rare | 10 | 21 |
| Total | 114 | 147 |

## Changes in Frequency

Classification as to frequency must of necessity be somewhat imprecise. Size of the bird influences frequency classification, as does annual fluctuations in numbers. If, for example, one sights 4 Great Blue Herons during a day, the species is going to seem very common. Seasonal and yearly fluctuations, particularly among waterfowl and sparrows, have resulted in changes from common (C) to uncommon (U). Species affected include Pied-billed Grebe (U), Northern Shoveler (U), American Coot (U), Red-headed Woodpecker (U), Great Crested Flycatcher (U), American Crow (U), Dark-eyed Junco (U), Chipping Sparrow (U), and Harris' Sparrow (U) (was *Abundant*). On the basis of additional sightings 3 species classified as *Rare* (1 sighting of 1 individual) have been changed to *U*: Roadrunner, Brown Thrasher, and Yellow Warbler. Green-winged Teal and White-crowned Sparrow have been changed from uncommon to common. A summary of results that change classifications can be gathered from Table 3. The most significant changes have been in the categories *uncommon* and *rare*. If the species changed from *rare* to *uncommon* in the second period are subtracted from the first period number of 10, it will be apparent that of the total new sightings, 14 have been classified as *rare*—that is, 1 record of 1 individual.

Earlier (Archer *op. cit.*) I pointed out that grackles and Black Vultures, though sighted within a few miles of the Park, had not been observed within it. Now these species have been added to the list. In the future, the Pedernales River will probably produce records, as will fall and spring migrations. Despite a mingling of species and races from east and west that occurs in the avifauna of the Park, some Edwards Plateau specialties have not yet been seen and do not seem likely to be found. These include Golden-cheeked Warbler and Rufous-crowned Sparrow. I hope to continue observing in the Park for migrants and for the occasionally surprising winter visitors and residents and perhaps to make an effort to compile nesting records.

# Responses of Three Species of Kingfishers to Fluctuating Water Levels below Falcon Dam

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Three species of kingfishers (Alcedinidae) regularly occur in Texas. One of the most likely areas to observe the three species is along a 20-km section of the Rio Grande River below Falcon Dam in Starr Co. (Lane 1971). South Texas represents the northern extent of the range for the small Green (*Chloroceryle americana*; 18 cm total length, 72 g) and large Ringed (*Ceryle torquata*; 38 cm, 290 g) Kingfishers, while the mid-sized Belted Kingfisher (*Ceryle alcyon*; 28 cm, 128 g) is wide-spread throughout North America. Ringed Kingfishers have expanded their range northward in recent years (Oberholser 1974) with breeding occurring near Falcon Dam (McGrew 1971). More recently, a Ringed Kingfisher was observed for several weeks during November and December 1979 along the Aransas River bordering the Welder Wildlife Foundation, San Patricio Co. (B. A. Fall, pers. comm.). Green Kingfishers are found year-round along the Rio Grande River and northward into the Edwards Plateau (Oberholser 1974). Belted Kingfishers are found throughout Texas, but are seen along the Rio Grande River only during the winter (Arvin 1977).

Oberholser (1974) suggested that the clear water resulting from the silt/pollution-trapping effect of Falcon Dam attracted kingfishers to the area. The floodway between the spillway and the main river channel (Fig. 1) may be particularly attractive to kingfishers because of water fluctuations that intermittently produce large pools and shallow flats or channels. These fluctuations result from daily (although irregular) releases of water through the "powerhouse," causing the main channel to periodically overflow into the floodway.

The vegetative community adjacent to the floodway and main channel is unique in being the largest undisturbed remnant of tropical thorn woodland in the United States and provides habitat for over 300 species of birds and many species of mammals, reptiles and amphibians (Lyndon B. Johnson School of Public Affairs 1976). The vegetation bordering the floodway is dominated by Black Willow (*Salix nigra*), Mexican Ash (*Fraxinus Berlandieriana*) and Mesquite (*Prosopis* sp.). Within the 135-m wide floodway are scattered clumps of Giant Reed (*Arundo donax*) and snags of dead willow and mesquite (Fig. 1), many of which serve as perch sites for kingfishers.

In this paper we discuss observations of kingfishers seen perched or feeding below Falcon Dam and relate these observations to fluctuating water levels oc-

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Fig. 1. Examples of water conditions in the floodway below Falcon Dam, Starr Co., Texas. (Upper) Low-water conditions typical of periods when power generation is not occurring. (Lower) High-water conditions present during daily periods of power generation (same view as in upper photo). For perspective in these photos, the floodway width is about 135 m and the farthest water in the distance is about 1200 m.

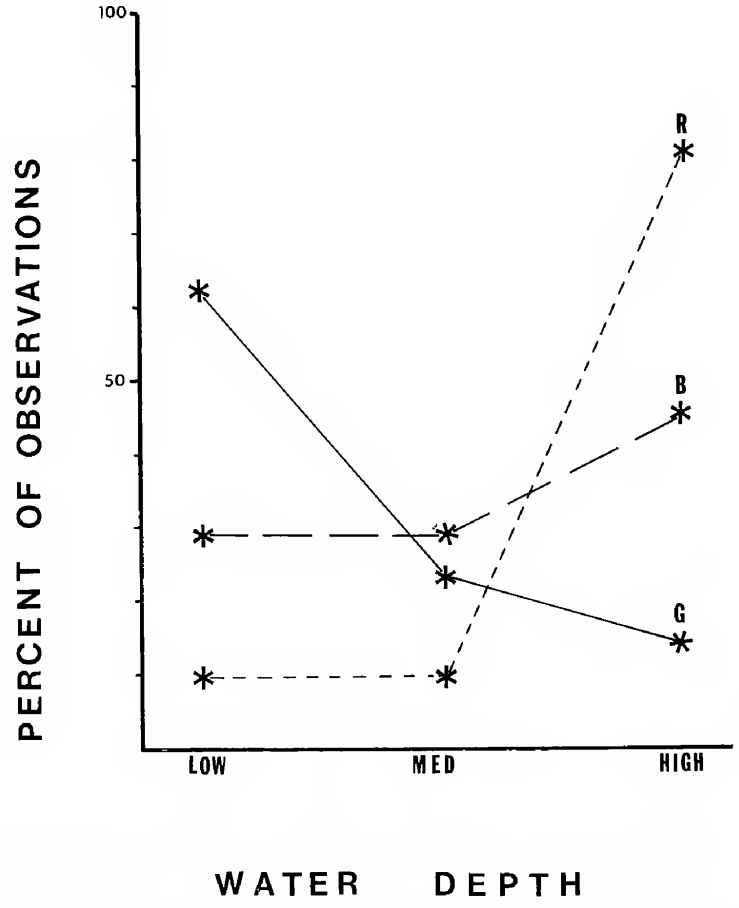


Fig. 2. Percent of observations occurring at low, medium, and high water levels for Green (G, n = 21), Ringed (R, n = 21), and Belted (B, n = 22) Kingfishers below Falcon Dam, Starr Co., Texas.

curring in that area. Kingfishers were observed for approximately 17 hours along the 1.5 km floodway and along 5 km of the main channel adjacent to the floodway confluence during 3 days in early January 1980. Water level present at each kingfisher sighting was classified as shallow (<15 cm), medium-depth (15–40 cm), or deep (>40 cm) and movements of kingfishers were noted relative to water conditions in the floodway.

## Results and Discussion

Observations of the three species of kingfishers were significantly disproportionate ($\chi^2 = 20.92$, 4 df., $P < 0.001$) among the water level categories (Fig. 2). Green Kingfishers were observed most often (62 percent) when water in the floodway was shallowest (Fig. 2). The lack of observations of this species at other times may indicate its movement to other feeding areas when water was deep in the floodway, or may be a result of its inconspicuousness when perched within the lower branches of the shoreline trees.

Ringed Kingfishers were most often observed in the lower portion of the floodway or along the main river channel where water was deep (Fig. 2). Observations of this species in the upper end of the floodway occurred during periods of highest water levels. This behavioral timing may be related to the water depth required

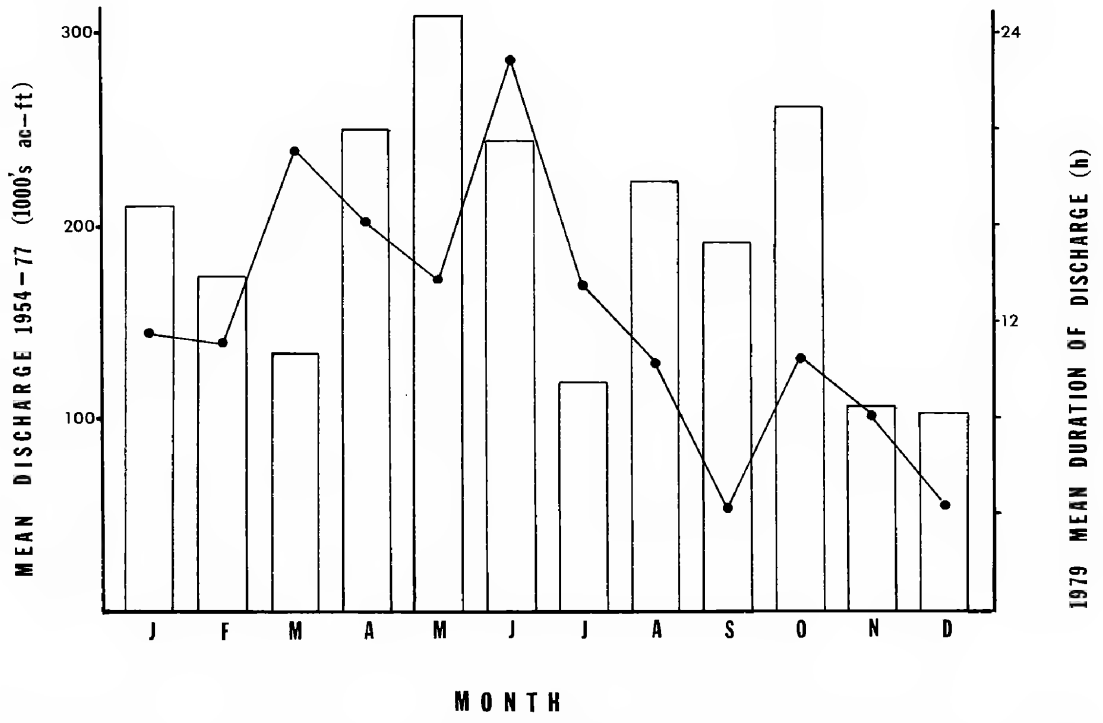


Fig. 3. Mean monthly discharge (bars) during the period 1954–1977 from Falcon Dam (International Boundary and Water Commission 1977), and mean daily duration of discharge (line) by month during 1979 (calculated from unpublished discharge data provided by W. E. VanLandingham).

by Ringed Kingfishers for diving, or alternatively, prey of Ringed Kingfishers may be larger than prey of Green Kingfishers. Larger fish may not appear in the upper end of the floodway until the water is deeper. Remsen (1978) found that differences in prey size (correlated with the body size of kingfishers) were the primary means of resource partitioning among 3- and 5-species communities of Neotropical kingfishers. Hence, differences in timing of floodway use by the three kingfishers may be a result of size differences in their prey.

Belted Kingfishers actively feed during all water depths, overlapping this behavior with Green Kingfishers in shallow water and Ringed Kingfishers in deeper water. Similar overlap was noted in the use of perches for feeding and resting by these species (Passmore and Thompson, unpubl. data).

Belted and Ringed Kingfishers often foraged by hovering for several seconds prior to diving; this behavior may be related to the tendency of these species to forage over deeper water. Green Kingfishers were seen foraging only from low perches (0.1 to 2.4 m above the water) near shallow water. Betts and Betts (1977) reported that this species in Costa Rica occasionally foraged by hovering 4–6 m above the water. All three species were seen beating their prey on branches or rocks until it was immobilized. This behavior also was noted for Woodland Kingfishers (*Halcyon senegalensis,* Greig-Smith 1978) and Amazon Kingfishers (*Chloroceryle amazona,* Skutch 1957).

Although the daily discharge times are unpredictable because they are based on changing power demands (W. E. VanLandingham, pers. comm.), water release usually began in early morning during our observations. The floodway began

filling about 0800 to 1000 h and was at maximum depth by 1030 to 1330 h; maximum depth was maintained only for a few hours. Commonly, water discharges continue through most of a day (W. E. VanLandingham, pers. comm.), and the resulting high water levels may induce Green Kingfishers to feed in other areas or perhaps decrease activity. Historically, November and December exhibit the lowest total discharge and the shortest average duration of discharge (Fig. 3). Such discharge characteristics would maximize the availability of shallow water, making these months most likely for finding Green Kingfishers along the floodway in the most easily viewed areas. Ringed as well as Green Kingfishers can likely be seen during all months, but the larger species will tend to be farther below the spillway regardless of water conditions.

Although activities of other fish-eating birds using the floodway were not quantified, we observed wading birds such as Great Blue Herons (*Ardea herodias*) and Great Egrets (*Casmerodias albus*) actively feeding during both flood and ebb flows, and at extreme low levels. Conversely, Ospreys (*Pandion haliaetus*) foraged in the floodway only during extreme high water.

In summary, the activities of three species of kingfishers below Falcon Dam appeared to be related to water level fluctuations caused by daily releases of water from the dam for power generation. Ringed Kingfishers were most often found near deeper water in the lower portion of the floodway and along the main channel adjacent to the floodway, while Green Kingfishers were more closely associated with shallow water found in the upper part of the floodway. November and December may provide the best opportunity to observe the two Neotropical species in and near the floodway because conditions suitable for both species are more prevalent.

This is contribution No. 108, Rob and Bessie Welder Wildlife Foundation.

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# Reproductive Success of Great Blue Herons at Nueces Bay, Corpus Christi, Texas

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## Introduction

Approximately 3200 pairs of Great Blue Herons (*Ardea herodias*) nest in Texas each year (Blacklock et al. 1979). Although the population seems to be stable on a state-wide basis, it was of interest to measure productivity in a colony nesting in a relatively polluted environment. Nueces Bay at Corpus Christi, Texas, was chosen as a study site because it is surrounded by an agricultural and industrial complex where the potential for chemical contamination of fish-eating birds via the food chain is high.

## Methods

Initially, we collected 17 Great Blue Heron eggs from Nueces Bay in 1978 to determine if organochlorine residues were high enough to warrant further study. Because some eggs had high levels of DDE (49 ppm), reproductive success was monitored the following year. Nueces Bay contains many small (<5 ha) dredge-spoil islands on which Great Blue Herons and other species of marine and estuarine birds nest. Our study site consisted of 1 such island where 37 pairs of Great Blue Herons nested in small trees. Thirty-one nests were marked with numbered wooden stakes on 16 and 23 March 1979 and then were checked weekly thereafter through 6 July. Nesting parameters, which included the number of viable and dead eggs, the number of living and dead young, and the condition of eggs and young, were recorded for each nest. On 16 March, 1 egg from each of 16 clutches was collected from Great Blue Heron nests on islands adjacent to our study site for organochlorine residue analysis.

Each whole egg was homogenized, mixed with sodium sulfate, and extracted with hexane on a Soxhlet apparatus. The extract was cleaned on a florisil column before being separated into 4 fractions on a silicar column and analyzed by gas chromatography. Residues in 5% of the samples were confirmed by mass spectrometry. Quantification limits were 0.1 ppm for pesticides and 0.5 ppm for PCBs on a wet weight basis. A detailed description of the analytical methods is included in Cromartie et al. (1975) and Kaiser et al. (1980).

Eggshells with membranes intact were dried for at least 30 days before the shell thickness was measured with a Starrett 1010 M micrometer. Similar procedures were followed when measuring pre-DDT era eggshells from Texas in the Quillin egg collection at the Rob and Bessie Welder Wildlife Foundation, Sinton, Texas.

## Results and Discussion

Great Blue Herons were occupying territories and building nests in Nueces Bay on 26 January 1979, but egg laying did not begin until 1 March. By 16 March,

Table 1. Reproductive summary of Great Blue Herons nesting in Nueces Bay, Texas, 1979.

| Nesting parameter | Number | Average/Pair |
|---|---|---|
| Eggs laid | 111 | 3.58 |
| Hatched | 76 | 2.45 |
| Survival of young | | |
| 1 week | 70 | 2.26 |
| 2 weeks | 64 | 2.06 |
| 3 weeks | 62 | 2.00 |
| 4 weeks | 56 | 1.81 |
| 5 weeks | 52 | 1.68 |
| Fledged | 50 | 1.61 |

48% of the nests contained complete clutches. Seven late-nesting pairs continued egg laying activities into May. Peak hatching occurred in mid-April. By mid-July, fledging was complete and very few herons, either adults or young, remained on the nesting island.

The summary of reproductive success is shown in Table 1. An average clutch size of 3.58 supports Henny's (1972) suggestion that there is a decline in clutch size from north to south with the central portion of the U.S. having a proportionately higher clutch size than either coast at the same latitude. Sixty-eight percent of the eggs hatched. An additional 17% were in active nests until around hatching, but then disappeared. We do not know whether these missing eggs hatched. Since hatching takes place asynchronously over a week's period (Pratt 1970), traces of unhatched eggs or just-hatched young might easily be obliterated by the activities of the older young in the nest. Nine percent of the eggs failed to hatch because they had been rolled out of the nest or broken. The final 6% disappeared during the course of incubation. After hatching, an average of 7% of the young were lost weekly for the next 5 weeks, but very little mortality was observed thereafter. Therefore, fledging was estimated to be 1.61 young per pair. This nest success rate is slightly lower than Henny's (1972) recruitment factor of 1.91 young per pair (based on a clutch size of 4.15), but the percentage of eggs yielding fledged young in our study (45%) is within the range reported by Henny and others in stable populations (Pratt 1970, Henny and Bethers 1971, Kelsall and Simpson 1979, Blus et al. 1980).

Twenty-five of 31 pairs hatched at least 1 of their eggs. Six pairs hatched no eggs. Five of these 6 pairs maintained active nests through the estimated hatching date; the other pair abandoned its nest about three-quarters of the way through incubation. Of the 25 pairs that hatched eggs, 23 fledged at least 1 young. Thus, most pairs that successfully completed incubation were able to fledge young. The overall reduction in productivity, however, was evenly divided between the incubation and care-of-young phases. Sixty-one eggs did not produce fledged young; 35 of the eggs failed or were lost during incubation and 26 nestlings died during the care-of-young stage.

Organochlorine residues in Great Blue Heron eggs from Nueces Bay are shown in Table 2. Generally, organochlorine residues were low in both years, although there was a decline in the number of chemicals detected and in their concentrations between 1978 and 1979. Almost all eggs contained DDE, PCBs, and chlordane isomers in both years, but the high levels of DDE (49 ppm) found in 12% of the

Table 2. Organochlorine residues (ppm wet weight) in Great Blue Heron eggs from Nueces Bay, Texas.

| | 1978[a] | | | 1979 | | |
|---|---|---|---|---|---|---|
| Compound | Median | Range | % Occurrence | Median | Range | % Occurrence |
| DDE | 3.67 | 0.95–49.00 | 100 | 3.00 | 1.40–6.50 | 100 |
| Dieldrin | 0.21 | 0.11–1.80 | 82 | 0.14 | 0.11–0.16 | 25 |
| Chlordane[b] | 0.85 | 0.26–2.38 | 94 | 0.32 | 0.13–1.08 | 100 |
| HCB | 0.15 | 0.10–0.25 | 41 | ND[c] | — | — |
| PCBs | 7.80 | 1.7–41.00 | 100 | 6.15 | 2.8–18.00 | 100 |

[a] Sample size = 17 in 1978 and 16 in 1979.
[b] Chlordane = Total chlordane isomers.
[c] ND = not detected.

eggs in 1978 were not present in 1979. Due to the variability, only the chlordane isomers showed a significant decrease (Chi-square test, $P < 0.01$) between 1978 and 1979. The number of samples containing dieldrin and hexachlorobenzene (HCB) dropped sharply between 1978 and 1979. Other chemicals analyzed for but found only at low levels in a small proportion of the samples were toxaphene and heptachor epoxide. Endrin and mirex were not detected in the samples.

Eggshell thickness averaged 0.37 mm and 0.40 mm in 1978 and 1979. Although our 1978 eggshells were significantly thinner ($P < 0.01$) than those of the historical collection, the thinning was only 5%, which is comparable to the intraclutch variation (5%), and probably not biologically significant. The 1979 eggshells showed no thinning.

Overall, productivity of Great Blue Herons appeared to be good in Nueces Bay in 1979 based on a nest success rate of 45% or 1.61 fledgings per pair. These estimates compare favorably with other studies of Great Blue Heron reproduction and are probably adequate to maintain a stable population. Organochlorine residues in eggs were below known-effect levels for most other birds (Stickel 1973) and are not suspected of causing reproductive impairment.

## Summary

An investigative survey in 1978 of organochlorine residues in Great Blue Heron eggs from Nueces Bay, Texas, revealed high DDE residues (49 ppm) in a small proportion of the samples. Reproduction was monitored in 1979 to evaluate the effects of pollutants on the Great Blue Heron population nesting in this relatively polluted environment. Clutch size of 31 marked nests averaged 3.58. There were 1.61 fledglings produced per nesting pair for an overall nest success rate of 45%. Based on other studies, this level of production appears to be adequate to maintain a stable population. DDE residues were low in eggs in 1979, with a median of 3.00 ppm (wet weight), and ranging up to 6.50 ppm. These levels are not suspected of inhibiting reproduction in Great Blue Herons.

## Acknowledgments

We thank the Rob and Bessie Welder Wildlife Foundation for allowing us to measure the Great Blue Heron eggshells in their collection, Lawrence Blus, Eugene Dustman, and James Keith for reviewing the manuscript, and Clementine Glenn for typing the manuscript.

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# GENERAL NOTES

## Raptor Use of an East Texas Clearcut

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Habitat management for raptorial birds is relatively new and few proven practices are known to favor populations (Edwards 1978). While clearcutting may decrease the availability of woodlands for forest-dwelling hawks, the open areas created by logging may provide suitable habitat for hawks that hunt open areas for ground-dwelling small mammals. Past studies in other areas of North America have shown that clearcutting typically increases the abundance of small mammals (Kirkland 1977; Martell and Radvanyi 1977; Ramirez and Hornocker 1981). Red-tailed Hawks (*Buteo jamaicensis*) in Virginia hunted in young clearcuts regularly (Conner and Adkisson 1974). The Red-tailed Hawk was the only species of hawk observed using these central Appalachian clearcuts.

In the present study we evaluate raptor use of a large pine-hardwood clearcut (511 ha) in Nacogdoches County, east Texas. The entire area was clearcut in 1975; residual vegetation was sheared, raked into windrows and burned. Loblolly pine (*Pinus taeda*) seedlings were planted in the winter of 1975–76. Numerous large snags and an occasional large live tree were distributed throughout the study area.

Raptors were counted during the spring and winter from 1978 to 1980 (3 winter and 3 spring seasons). During 9 visits each season, hawks were censused while observers drove on dirt roads (2.8 km) and walked transect lines and trails (about 4,500 m) in the clearcut. Each census trip covered the same driving and walking distances over all 3 years of the study. Raptors were counted if they were perched in a snag or live tree, or if they were soaring above the clearcut and appeared to be searching for prey.

Wintering Red-tailed Hawks, Northern Harriers (*Circus cyaneus*), and American Kestrels (*Falco sparverius*) typically hunt in open areas and were fairly common in the large clearcut during the first 2 years of the study (Table 1). Red-shouldered Hawks (*Buteo lineatus*) and Cooper's Hawks (*Accipiter cooperii*) normally inhabit forested areas, but were observed occasionally foraging over the clearcut. These two species typically stayed within 500 m of the forest edge.

Abundance of wintering raptors decreased as the stand aged. Total raptors detected during winter declined from 47 during the first winter sampling to 16 2-

[1] Maintained in cooperation with the School of Forestry, Stephen F. Austin State University, Nacogdoches, TX 75962.

Table 1. Total number of raptors observed during 9 census trips to a large east Texas clearcut.

| | Species | | | | | | |
|---|---|---|---|---|---|---|---|
| | RTHK[1] | RSHK | NHAR | KEST | COHK | UNID | TOTAL |
| Winter: Dec–Jan | | | | | | | |
| 1977–78 | 26 | 3 | 2 | 10 | | 6 | 47 |
| 1978–79 | 21 | 2 | 7 | 6 | 2 | 4 | 42 |
| 1979–80 | 12 | | 3 | 1 | | | 16 |
| Spring: May | | | | | | | |
| 1978 | 5 | | | 1 | | | 6 |
| 1979 | 13 | 2 | | | | | 15 |
| 1980 | 7 | | | | | | 7 |

[1] RTHK—Red-tailed Hawk, RSHK—Red-shouldered Hawk, NHAR—Northern Harrier, KEST—American Kestrel, COHK—Cooper's Hawk, UNID—unidentified raptor.

years later (Table 1). We did not collect data in the winter of 1980–81, and only one Northern Harrier was observed during our series of regular census visits in January of 1982. This decline in raptor abundance possibly reflected increasing height and density of vegetation in the clearcut. Height of the tallest dominant vegetation was 2.1 m in June of 1977, 3.2 m in 1978, and 3.5 m in 1979. Foliage density of vegetation at 2 and 3 m increased during this period (Dickson et al., unpubl. data). Increasing vegetation height and density may have reduced the ability of raptors to detect and capture prey. Although raptor prey populations were not sampled, a decline probably had not yet occurred during this period of stand development. In plantations in Georgia, Atkeson and Johnson (1979) found that small mammal abundance peaked in plantations 3 and 4 years old.

Red-tailed Hawks were the most abundant raptor during the spring (Table 1). More Red-tailed Hawks were detected in 1979 than in other years because a pair nested in a live tree about 100 m from one of our transect lines and most of these sightings involved the nesting pair. Raptors were less abundant during spring than winter, probably because the Red-tailed Hawk, Northern Harrier, American Kestrel, and Cooper's Hawk are not normally present in this geographical area during spring, and Red-shouldered Hawks prefer mature woods for nesting.

The first 3 to 4 years following clearcutting of pine-hardwood forests in east Texas provides areas suitable for wintering habitat and some nesting habitat for a variety of raptors. Numerous snags left standing in the clearcut were regularly used as perches for both preening and hunting. We recommend that snags and some large live trees be left standing in clearcuts to enhance the quality of habitat for raptors. These snags would also benefit cavity nesting fauna.

We thank R. R. Fleet and R. M. Whiting for constructive comments on an early draft of the manuscript.

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## Barn Owl Nest Activity and Behavior of Incubating Adult

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This note reports Barn Owl (*Tyto alba*) nest activity and a particular behavior of the incubating adult owl. The nest was in an abandoned water tower 10 km NE of Fort Worth, Tarrant County, Texas.

The dimensions of the water tower were 3.3 m in height and 2.5 m in diameter with a 0.6 m opening at the top on the southeast side. The tower was situated on a 6 m platform. A 3 m steel-rod ladder (with a 75° angle) within the tower made it easy for us to enter and check the nest.

On 19 March 1976, two adult owls and five eggs were discovered on the west side in the bottom of the tower. After 19 March, nest checks occurred the following two weeks and every other week thereafter. Eggs were laid directly on the organic debris from matted regurgitated pellets (Otteni *et al.*, Wilson Bull. 84:434–448, 1972). The full clutch contained 7 eggs; 6 hatched. By 11 June, all young had fledged.

A particular behavior of the incubating adult was noted on two occasions. While collecting pellets, KLH accidently frightened the adult on 2 April (7 eggs present) and 17 April (4 eggs and 3 young present). On both occasions, instead of flying directly out of the tower (as was previously observed) or to the top of the ladder, the adult flew to the bottom rung of the ladder and climbed rung by rung to the top. The bird stepped onto the rung one talon at a time with very little wing movement, caught its balance, and proceeded to the next rung. The owl did not exhibit the typical defense behavior of swaying back and forth and side to side, bobbing its head or displaying its wings (Sumner, Condor 31:85–111, 1929). Upon leaving the tower, KLH gently shook the ladder to force the bird to move. On the first occasion, the owl flew back to the eggs; on the second, it flew out of the tower but returned shortly.

We have found no information concerning "climbing" ability in owl literature. However, Potter and Gillespie (Auk 42:177–192, 1925) observed a barn owl hop from the floor of a building to a window sill. They also witnessed the owl flying from a window sill to nearby stairs, but no "climbing" occurred.

We thank R. D. Slack and one anonymous reviewer for examining an earlier version of this paper. This study was funded in part by a Grant-in-Aid of Research award from the Sigma Xi Society.

## Fatal Aerial Collision and Stomach Contents of a Chimney Swift

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On 19 August 1979 at about 1900 CST in Nacogdoches, Texas, I saw two Chimney Swifts (*Chaetura pelagica*) collide head-on at about 10 m above the ground. I could not tell if the collision was an agonistic encounter or an aerial miscalculation. One of the two birds flew off apparently unharmed. The other fell straight down without any wing flutter, landed head first on a concrete driveway, and died within 1 h. Three other Chimney Swifts were flying in the vicinity of the 2 that collided, but probably had no influence on the collision as they were at least 20 m distant. As there was no insect swarm in the area, concentration on feeding activity cannot explain the collision. The swifts appeared to fly toward each other for about 15 m prior to collision. This evidence suggests that the collision may have been intentional on the part of one or both birds.

X-ray and autopsy revealed that the swift had a fractured skull with extensive hemorrhaging. It was impossible to say whether the swift's skull was fractured by the impact with the other swift or with the concrete. However, judging from the sound made by the swift's impact with the driveway, I suspect that substantial damage occurred then.

Of the 115 insects in the Chimney Swift's stomach 70% were winged ants (Hymenoptera), 15% bark beetles (Coleoptera: Scolytidae—10% Ips, 5% *Dendroctonus*), 10% termites (Isoptera), and 5% miscellaneous insect parts. Bent (U.S. Natl. Mus. Bull. 176, 1940) noted that beetles, flies, and ants were the principal diet of Chimney Swifts.

I thank R. R. Fleet and J. C. Kroll for comments on an early draft.

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## Range Extension of the Pauraque in Texas

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The Pauraque (*Nyctidromus albicollis*) is a wide-ranging neotropical caprimulgid with a limited United States range. In Texas it has been recorded from the lower Rio Grande Valley north to Bexar, De Witt and Zavala counties (Oberholser 1974, *The Bird Life of Texas,* Univ. Texas Press, Austin; Arnold 1977, Bull. Texas Ornithol. Soc. 10:17–18). I report here an old record from Maverick County where it has not been recorded previously.

On 23 March 1971 David Fischer, Byron Berger and I were camped on the banks of the Rio Grande between Quemado and Normandy in north-central Maverick County. The area is now primarily agricultural but in 1971 there were some fairly extensive plots of native brush on both sides of the river.

At dusk we began hearing Pauraques. All of the birds appeared to be calling from the Mexican side of the river. None of us were familiar with the species or had heard its call in the wild before but Berger and West were familiar with the voice from recordings. Upon hearing the bird, we played a tape of its call. The bird responded by repeating its call several minutes and then became silent. I played the recording again and the next time the bird called it was on our side of the river at a distance of 7–10 m. Shortly thereafter the bird responded from the Mexican side of the river. This leap-frogging, back and forth across the river apparently in response to our recording happened seven times. At one time on the U.S. side it called from the ground at a distance of about 3 m. By using flashlights, we located this individual several times on the ground and in flight. The large white patches in the wings and tail were noted.

Although our recording apparently brought in only 1 bird, we estimated there were at least 6 calling within 175–200 m. Pauraques were heard calling mainly on the Mexican side of the river with the exception of the individual attracted to our tapes and one which occasionally called upriver from our location, but on the U.S. side.

All of the birds uttered the typical Pauraque call. In addition the one we attracted sometimes gave a different call, one very low that would have been missed had it been farther away from us. The birds called until at least 2300.

This record extends the range of the species upriver from the range as recorded in Oberholser (1974, *op. cit.*). Whether it still occurs in the area or not is unfortunately not known as I have not been back to the area.

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## Texas County Records for Bird Specimens in the Corpus Christi State University Collection

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Following the publication of Oberholser's (1974) volumes, Barr et al. (1975) suggested that additions to the distributional records in Oberholser should be compiled by persons at institutions housing avian specimen collections. This list (Table 1) is a compilation of specimens in the ornithological collection at Corpus Christi State University for which no county records are reported in either of the above publications or in other recent compilations (Bryan and Moldenhauer 1977; Gallucci and Scudday 1978; Dowler et al. 1978; Gallucci 1979).

These records were included following the "rules" outlined by Gallucci and Scudday (1978). The listing follows the taxonomic order of Oberholser (1974),

Table 1. Texas county specimen records.

| Species | Common name | County | Date |
|---|---|---|---|
| *Clangula hyemalis* | Oldsquaw | Lamar | Nov 1975 |
| *Melanitta perspicillata* (*Pelionetta perspicillata*) | Surf Scoter | Nueces | Nov 1977 |
| *Accipiter striatus* | Sharp-shinned Hawk | Jim Wells | no date |
| *Accipiter cooperii* | Cooper's Hawk | Nueces | Apr 1978 |
| *Rallus elegans* | King Rail | Fort Bend | Mar 1980 |
| *Tyto alba* | Barn Owl | Live Oak | Jan 1978 |
| *Otus asio* | Screech Owl | Karnes | Jan 1978 |
| *Asio flammeus* | Short-eared Owl | Kenedy | Jan 1980 |
| *Sterna hirundo* | Common Tern | San Patricio | Feb 1980 |
| *Dendroica petechia* | Yellow Warbler | Kleberg | May 1976 |

but where Oberholser's nomenclature differs from that of the A.O.U. Checklist (1957) and supplements (1973, 1976), it is given in parenthesis.

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# Direct and Indirect Human Impact on Least Tern Nesting Success at Falcon Reservoir, Zapata County, Texas

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Many colonial waterbirds including the Least Tern, *Sterna albifrons* (Pallas), suffered serious population declines due to past demand for feathers by the mil-

linery trade (Bent 1921:270). As a result, one subspecies—*S. albifrons athalassos* (Burleigh & Lowery), the Interior Least Tern—is listed by the U.S. Fish & Wildlife Service and the Texas Parks and Wildlife Department as Endangered. The Eastern Least Tern of the Atlantic and Gulf coasts (*S. albifrons antillarum* Lesson) is a Protected Non-Game species in the State of Texas (Tex. Parks & Wildlife Leaflets 7000-21, 22; March 1978). Blacklock et al. (1979:258) stated that "the least tern may be one of the most threatened birds in Texas." Prior to human modification of original nesting habitat, the Least Tern nested along the Gulf coast and sandbars of the Rio Grande (Sennett, 1878, 1879).

Recent observations of the Least Tern (believed to be ssp. *antillarum*; Oberholser 1974) at Falcon State Recreation Area, Zapata County, Texas, have illustrated the complexity of anthropogenic factors which impinge upon the success of this species. On 17 May 1979, a colony estimated at 40–50 birds was observed attempting to nest on the shore of Falcon Reservoir. A total of 34 birds was counted on the ground at one time. An estimate of 100 birds was reported several days earlier by park visitors (*in litt.* John and Elizabeth Codbury, 11 May 1979). Courtship behavior observed included presentation of a captured fish by a male to a female as well as mounting attempts (all short-lived). We observed communal mobbing by up to six Least Terns of both humans (*cf.* Pemberton 1922) and female Great-tailed Grackles (*Quiscalus mexicanus*). That such defensive measures by the terns were not always successful was indicated by the presence of at least one broken eggshell resulting from grackle predation. The nest containing the broken egg showed no evidence of disturbance by human foot traffic or vehicular activity.

Nesting occurred on a "shell" beach of Falcon Reservoir. The shell consisted of fossil oysters (*Ostrea alabamiensis georgiana* Conrad) from the Laredo Formation (Eocene). Shell material had been crushed by wave action and park visitor vehicles which had been used to launch boats at this site. Further sorting by particle size was accomplished by wave action. At the time of observation, the nesting area was not being utilized by park visitors because the lake level allowed use of an alternate, more preferable launch site. Vehicular traffic and wave action prevented establishment of significant amounts of vegetation at the nesting locale; heavily vegetated areas are avoided by nesting Least Terns. Nests consisted of small "scooped-out" areas in the substrate as opposed to the "saucerlike" nests described by Kincaid (Oberholser 1974). A total of eleven nesting pits were observed; all but one nest (with two eggs) contained only a single egg. No active nests were reported on 11 May (Codbury, *op. cit.*). No plant or other nest material was present in the nesting depressions.

Observation of a sizeable nesting population of a declining species was encouraging. Unfortunately, this small rookery area was abandoned on 19 May 1979 (pers. comm. Raul Guerra). Hatchlings were not observed. Presence of additional broken egg shells indicates that abandonment of this area was due to predation pressure by Great-tailed Grackles.

We can report, however, that the Least Tern is successfully nesting elsewhere along the shoreline of Falcon Reservoir. Significantly, no Great-tailed Grackles were seen in this area. Grackles are absent from this area because this alternative nesting area is adjacent to an area of relatively undisturbed vegetation with no human structures.

This Falcon State Recreation Area population of the Least Tern illustrates the complexity of human impacts upon the species. Ironically, this population of terns was nesting in an area on a human-created reservoir on a substrate kept clear of vegetation by human activities but was driven out by a perianthropic species (Great-tailed Grackle) which occurs in this area only due to human alteration of the terrestrial environment. While the Great-tailed Grackle occupied certain habitats prior to human alteration of the environment, co-occurrence of the Least Tern and Great-tailed Grackle is probably of recent origin.

We wish to thank John and Elizabeth Codbury in addition to Raul Guerra for their personal observations.

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# Vocal Mimicry in the Curve-billed Thrasher

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Vocal mimicry in the Curve-billed Thrasher (*Toxostoma curvirostre*) has been reported in the literature only once, to my knowledge (Oberholser 1974, *The Bird Life of Texas,* Univ. Texas Press, Austin). The present report quantifies vocal mimicry in 2 Curve-billed Thrashers that were recorded March 20–22, 1980, 2 miles NW of Wink, Texas. Each bird was recorded for 3 hours (10 minute sessions), but no attempt was made to record at specific times during the day, since strong and variable winds made recording impossible much of the day.

The recordings were later played and the percent of the total time devoted to mimicry was calculated (Table 1). It is possible that vocalizations I interpreted as being unique to the Curve-billed Thrasher (i.e. non-imitative and part of its species-specific repertoire) were in fact imitations that were unrecognizable to me as such. Also, the imitations of the Cardinal and Pyrrhuloxia were frequently not precise enough to permit the imitations of these two species to be distinguished.

Table 1. Percent vocalization time in which Curve-billed Thrashers imitated songs of other species

| Species observed in the study area | Scientific Name | Bird A (%) | Bird B (%) |
|---|---|---|---|
| Red-tailed Hawk | (*Buteo jamaicensis*) | 0.4 | 0.1 |
| Northern Harrier | (*Circus cyaneus*) | 0.0 | 0.0 |
| American Kestrel | (*Falco sparverius*) | 0.8 | 0.0 |
| Scaled Quail | (*Callipepla squamata*) | 0.1 | 0.0 |
| Greater Roadrunner | (*Geococcyx californianus*) | 0.0 | 0.0 |
| Burrowing Owl | (*Athena cunicularia*) | 0.0 | 0.0 |
| Ladder-backed Woodpecker | (*Picoides scalaris*) | 0.1 | 0.7 |
| Scissor-tailed Flycatcher | (*Tyrannus forficatus*) | 3.3 | 5.4 |
| Say's Phoebe | (*Sayornis saya*) | 0.0 | 0.1 |
| Chihuahuan | (*Corvus cryptoleucus*) | 0.0 | 0.0 |
| Verdin | (*Auriparus flaviceps*) | 0.0 | 0.0 |
| Bewick's Wren | (*Thryomanes bewickii*) | 0.2 | 0.1 |
| Cactus Wren | (*Campylorhynchus brunneicapillum*) | 1.1 | 0.8 |
| Rock Wren | (*Salpinctes obsoletus*) | 0.0 | 0.0 |
| Sage Thrasher | (*Oreoscoptes montanus*) | 0.0 | 0.0 |
| Loggerhead Shrike | (*Lanius ludovicianus*) | 0.0 | 0.0 |
| Northern Cardinal<br>Pyrrhuloxia | (*Cardindalis cardinalis*)<br>(*Cardinalis sinuata*) | 2.1 | 5.9 |
| Lark Bunting | (*Calamospiza melanocorys*) | 0.0 | 0.0 |
| Vesper Sparrow | (*Pooecetes gramineus*) | 0.0 | 0.0 |
| Cassin's Sparrow | (*Aimophila cassinii*) | 0.0 | 0.0 |
| White-crowned Sparrow | (*Zonotrichia leucophrys*) | 0.0 | 0.0 |
| Eastern Meadowlark | (*Sturnella magna*) | 0.0 | 0.0 |
| Brewer's Blackbird | (*Euphagus cyanocephalus*) | 0.0 | 0.0 |
| House Finch | (*Carpodacus mexicanus*) | 0.0 | 0.0 |
| House Sparrow | (*Passer domesticus*) | 0.0 | 0.0 |
| TOTAL (%) | | 8.1 | 13.1 |

The fact that the Scissor-tailed Flycatcher was frequently mimicked, but had not yet returned from its wintering quarters, suggests that songs learned one year are remembered throughout the winter.

It is possible that the incidence of mimicry in the Curve-billed Thrasher varies geographically, which could explain why it has been unreported from other areas where the species is common. No mockingbirds were found within a 7 km radius of the study site, which raises the question of whether or not the presence of other mimics influences mimicry in the Curve-billed Thrasher.

# BOOK REVIEW

BIRDS OF THE GREAT PLAINS: BREEDING SPECIES AND THEIR DISTRIBUTION by Paul A. Johnsgard. 1979. University of Nebraska Press, Lincoln. 590 pp. $25.00.—Paul Johnsgard is at the University of Nebraska at Lincoln, a position lending itself well to authoring a book on Great Plains birdlife. He is best known for his authoritative publications on waterfowl. Bibliophiles should be familiar with his work; this is the ninth book either authored or edited by this prodigious writer.

A comprehensive treatise on Great Plains birds has long been needed. The best available work has been Sutton's *Oklahoma Birds,* although it is limited to the southern plains. In the past two decades, the great grassland division of the continent has been an important natural laboratory for studies of species limits in some east-west species pairs and of dynamics of grassland bird communities. The region boasts some of this continent's greatest wildlife spectacles with massive aggregations of waterfowl and Sandhill Cranes. In anticipation of a compendium of up-to-date knowledge of the region, the book falls somewhat short of expectations.

Johnsgard intended the book for a "rather broad, nontechnical audience." The objectives were to provide a guide to breeding distribution and a summary of breeding biology for those species that breed in the central Great Plains. The book contains an introduction, a lengthy annotated list of species, two appendices detailing bird watching localities and checklists for some parks and refuges, and a list of references to the region's birdlife.

The introduction includes descriptions of topography, landforms, climate, and vegetation of the Great Plains. Slightly more than nine pages in this section analyze zoogeographical affinities and ecology of 325 species. The reader is referred to another Johnsgard publication (1978, Ornithogeography of the Great Plains. Prairie Naturalist 10:97–112) for his extended thoughts on this topic.

In the introduction, Johnsgard explains his rationale for limiting the geographic scope to less than the entire Great Plains unit. He writes "I first hoped to consider the entire Great Plains as a comprehensive unit, but a survey of the literature rapidly made it apparent that from either a geological or botanical standpoint the region was far too large to be dealt with easily." One wishes that he had taken the time or had the resources to include all of the Great Plains, as is implied in the book's title. He chose to "saddle the 100th meridian" by including five states (Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota) and parts of six others. The Canadian prairie provinces and Montana, Wyoming and much of eastern Colorado are excluded due to "severely-limited" information on breeding birds. The Texas reader will be disappointed to find that only the panhandle proper of his state is included. Several other distinct subregions of the Great Plains constitute nearly one-half of the land surface of Texas. Their exclusion is a major omission and deprives the reader of information on the changing avifauna of these recently xeric scrub dominated grasslands.

Each species account includes about one page of statements on breeding status, breeding habitat, nest location, clutch size and incubation period, time of breed-

ing, and breeding biology. The account ends with at least one suggested source of additional reading on the species. Valuable additions here are numerous references to unpublished theses. At first glance these accounts seem short, but they contain more than adequate summaries of the species' biology in the Central Great Plains. A distribution map is placed in the margin beside each account. A short way into this section the reader is likely to flip back to the introduction for an explanation of the difference in meaning among horizontal, vertical, and oblique lines on the maps. No explanation is offered; apparently, they all denote the same thing—usual residential range.

The somewhat arbitrary compromise in assigning geographic limits makes for some strange additions and partial deletions to the Great Plains avifauna. The northern half of Johnsgard's eastern boundary is the 95th meridian, taking in the northern coniferous forest of extreme western Minnesota. At least 42 species (13% of the species in the book) are largely restricted to this portion of the area of concern, and 20 species are found nowhere else in the region (i.e. Spruce Grouse, Olive-sided Flycatcher, Boreal Chickadee, and 12 species of warblers). The southeast limits of the defined area contain the Oak-Hickory forests of Oklahoma and Kansas. Consequently, Anhinga, Red-cockaded Woodpecker, Fish Crow, Brown-headed Nuthatch, Swainson's Warbler, Bachman's Sparrow and other southeastern species find their way into the accounts.

Inclusion of these peripheral and uncharacteristic birds would be less bothersome if the north-south shortening of the Great Plains did not cut off distributions of typical grassland and savannah birds. For example, at Johnsgard's northern limit, distributions are cut off for Sprague's Pipit, Lark Bunting, and Chestnut-collared Longspur. McCown's Longspur is almost missed entirely. Southern limits of Mississippi Kite, Lesser Prairie Chicken, and Snowy Plover are left off at the Red River. These unfortunate boundaries necessitated frequent use of the statement "outside the limits of the region covered by this book."

The color photographs are of exceptional quality and quite entertaining, as are some of Johnsgard's line drawings. His renditions of Greater Prairie Chicken, Marbled Godwit, Barred Owl, and Common Nighthawk are particularly appealing. Typo errors seem to be few. Trautman and Glines in the text (p. 139) become Trautman and Clines in the reference list, and Tramontano 1964 in the text (pp. 328–329) becomes Tramontano 1864 in the reference list.

Johnsgard's goal of largely directing this book to a general audience is well achieved. Despite its serious limitations as a complete reference to the avifauna of the Great Plains, as is implied by the title, professionals and amateurs will find it a useful and up-to-date list of the breeding birds of Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota. On that basis it is a good buy.—*Terry C. Maxwell.*

## NOTES AND NEWS

ABOUT THE ARTIST.—The illustration of the Golden Eagle (inside front cover) is an original pencil drawing by Carol Smith Dickinson. Carol graduated from Texas A&M University with a BS degree in Wildlife Ecology. She is currently employed by the U.S. Fish and Wildlife Service stationed at the Aransas National Wildlife Refuge near Austwell, Texas. Carol enjoys art as a hobby and prefers wildlife illustration. Carol resides on the refuge at P.O. Box 100, Austwell, Texas 77950.

RECENT TEXAS COUNTY RECORDS.—Submission of new, substantiated Texas county bird records should be sent to the *Bulletin* editor. General guidelines for submission are given in the *Bulletin,* Vol 12(2):55–57. The "Recent Texas County Records" section will not preclude articles on additions from systematic collections which heretofore have not been treated separately. Further, this section will not take the place of articles or notes on species significant range extensions, unusual seasonal occurrences, breeding documentation, or other reports of biological significance.

The *Bulletin* and *Newsletter* of the *Texas Ornithological Society* are issued to all members not in arrears for dues. Membership in the *Texas Ornithological Society* is open to all persons interested in observation, study, and conservation of birds in Texas. Membership dues are $5.00 per year (student), $10.00 per year (active), $20.00 per year (sustaining), $200.00 paid once, or in $50.00 annual payments over a period not to exceed four years (life). Inquiries regarding membership should be addressed to Ms. Jolene Boyd, TOS, Dept. Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843. Original articles, reports and other items submitted for inclusion in the *Bulletin of the Texas Ornithological Society* should be sent to the editor, R. Douglas Slack, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas 77843.

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